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| 10/671,730 | 09/29/2003 | Yong-Deok Chang | 1349.1180 | 6738 |

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STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

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| EXAMINER |
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ODOM, CURTIS B

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| ART UNIT | PAPER NUMBER |
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2611

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 12/29/2006 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/671,730

Applicant(s)

CHANG ET AL.

Examiner

Curtis B. Odom

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-22, 26, 27, 38, 39, 41 and 42 is/are allowed.
- 6) ☒ Claim(s) 1-4, 9-13, 18, 23, 28-31, 36, 37 and 40 is/are rejected.
- 7) ☒ Claim(s) 8, 14-17, 24, 25 and 32-35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
- Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 9, 18, and 24-25 are objected to because of the following informalities:
 - a. In claim 9, the phrase “a second error calculation unit to calculate a second equalization error value” is suggested to be changed to “an error calculation unit to calculate an equalization error value”.
 - b. In claim 18, the phrase “second error calculating for calculating a second equalization error value” is suggested to be changed to “error calculating for calculating an equalization error value”.
 - c. Regarding claims 24 and 25, in claim 24, the phrase “with N and K being” is suggested to be changed to “with N and K being natural numbers”.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 37 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

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the invention. Claim 18 recites an apparatus (receiver) and the method steps of using the apparatus. MPEP 2173.05(p) states:

A single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. 112, second paragraph. * > IPXL Holdings v. Amazon.com, Inc., 430 F.2d 1377, 1384, 77 USPQ2d 1140, 1145 (Fed. Cir. 2005); < Ex parte Lyell, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990) * > (< claim directed to an automatic transmission workstand and the method * of using it * held ** ambiguous and properly rejected under 35 U.S.C. 112, second paragraph >) < .

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 9-13, 18, 23, 28-31, 36, 37, and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Birru (U. S. Patent No. 7, 006, 566).

Regarding claim 1, Birru discloses a channel equalizer (Fig. 13, see Abstract) for a single-carrier receiver, comprising:

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a first equalizer (Fig. 13, block 1310) having a first feed forward (FF) unit (see Fig. 13, block 710) to eliminate channel distortions (pre-ghost) as described (in column 12, lines 5-11) of an input signal and a first feedback (FB) unit (Fig. 13, block 720) to eliminate channel distortions (post-ghost) of the input signal;

a Trellis decoder (Fig. 11, block 250, see column 10, lines 49-67) for Trellis-decoding an output signal of the first equalizer; and

a second equalizer (Fig. 3, block 1320) having a second FF unit (Fig. 13, block 1350) to eliminate the pre-ghost of the input signal and a second FB unit (Fig. 13, block 1340) to eliminate the post-ghost of the input signal based on an output signal of the Trellis decoder (see column 18, lines 4-8).

Regarding claim 2, Birru discloses a buffer to store the input signal, input to the first equalizer, for a certain period of time (see Fig. 13, block 1330, see column 14, lines 18-21).

Regarding claim 3, Birru discloses the Trellis decoder has an entire path memory (decoding depth) of 12 to 16 symbols (see column 12, lines 61-63) and an entire traceback delay symbol amount of 144 symbols to 192 symbols (see column 12, line 63-column 13, line 3).

Regarding claim 4, Birru discloses a first error calculation unit (Fig. 10, 1020) to calculate an LMS equalization error (see column 13, lines 40-45) value based on an added signal of an output signal of the first FF unit and an output signal of the first FB unit, wherein the LMS equalization error is used to update the FF and FB unit coefficients (see column 12, lines 5-33).

Regarding claim 9, Birru discloses an error calculation unit to calculate an equalization error value based on the output signal of the Trellis decoder (see column 16, lines 21-30).

Regarding claim 10, the claimed method includes features corresponding to the above rejection of claim 1, which is applicable hereto.

Regarding claim 11, the claimed method includes features corresponding to the above rejection of claim 2, which is applicable hereto.

Regarding claim 12, the claimed method includes features corresponding to the above rejection of claim 3, which is applicable hereto.

Regarding claim 13, the claimed method includes features corresponding to the above rejection of claim 4, which is applicable hereto.

Regarding claim 18, the claimed method includes features corresponding to the above rejection of claim 9, which is applicable hereto.

Regarding claim 23, Birru discloses a channel equalizer (Fig. 13, see Abstract) for a single-carrier receiver, comprising:

- a first equalizer (Fig. 13, block 1310) having a first feed forward (FF) unit (see Fig. 13, block 710) to eliminate channel distortions (pre-ghost) as described (in column 12, lines 5-11) of an input signal and a first feedback (FB) unit (Fig. 13, block 720) to eliminate channel distortions (post-ghost) of the input signal;

- a buffer to store the input signal, input to the first equalizer, for a certain period of time (see Fig. 13, block 1330, see column 14, lines 18-21);

- a Trellis decoder (Fig. 11, block 250, see column 10, lines 49-67) having an entire path memory (decoding depth) of 12 to 16 symbols (see column 12, lines 61-63) and an entire traceback delay symbol amount of 144 symbols to 192 symbols (see column 12, line 63-column 13, line 3), and to Trellis-decode an output signal of the first equalizer; and

a second equalizer (Fig. 3, block 1320) having a second FF unit (Fig. 13, block 1350) to eliminate the pre-ghost of the input signal and a second FB unit (Fig. 13, block 1340) to eliminate the post-ghost of the input signal based on an output signal of the Trellis decoder (see column 18, lines 4-8), and a second error calculation unit (see column 16, lines 21-30) to calculate a second equalization error value based on the output signal of the Trellis decoder.

Regarding claim 28, Birru discloses a receiver (Fig. 2) comprising:

a demodulator (Fig. 2, blocks 210 and 220, see column 11, lines 9-12) to convert a received signal to a stream of digital (baseband) symbols;

a channel equalizer (Fig. 2, block 240) to compensate for channel distortions in the demodulated received signal (see Abstract);

a phase tracking (recovery) unit (Fig. 2, block 240) to track (recover) the phase of the channel equalized signal (see column 7, lines 47-50); and

a decoder (Fig. 2, block 270) to decode the phase recovered (tracked) signal (see column 7, lines 52-54),

wherein the channel equalizer further comprises a first equalizer (Fig. 13, block 1310) having a first feed forward (FF) unit (see Fig. 13, block 710) to eliminate channel distortions (pre-ghost) as described (in column 12, lines 5-11) of an input signal and a first feedback (FB) unit (Fig. 13, block 720) to eliminate channel distortions (post-ghost) of the input signal;

a Trellis decoder (Fig. 11, block 250, see column 10, lines 49-67) for Trellis-decoding an output signal of the first equalizer; and

a second equalizer (Fig. 3, block 1320) having a second FF unit (Fig. 13, block 1350) to eliminate the pre-ghost of the input signal and a second FB unit (Fig. 13, block 1340) to

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eliminate the post-ghost of the input signal based on an output signal of the Trellis decoder (see column 18, lines 4-8).

Regarding claim 29, Birru discloses a buffer to store the input signal, input to the first equalizer, for a certain period of time (see Fig. 13, block 1330, see column 14, lines 18-21).

Regarding claim 30, Birru discloses the Trellis decoder has an entire path memory (decoding depth) of 12 to 16 symbols (see column 12, lines 61-63) and an entire traceback delay symbol amount of 144 symbols to 192 symbols (see column 12, line 63-column 13, line 3).

Regarding claim 31, Birru discloses a first error calculation unit (Fig. 10, 1020) to calculate an LMS equalization error (see column 13, lines 40-45) value based on an added signal of an output signal of the first FF unit and an output signal of the first FB unit, wherein the LMS equalization error is used to update the FF and FB unit coefficients (see column 12, lines 5-33).

Regarding claim 36, Birru discloses an error calculation unit to calculate an equalization error value based on the output signal of the Trellis decoder (see column 16, lines 21-30).

Regarding claim 37, the claimed includes features corresponding to the above rejection of claim 28, which is applicable hereto.

Regarding claim 40, Birru discloses a receiver (see Fig. 2) including the limitations of claim 23, comprising:

- a demodulator (Fig. 2, blocks 210 and 220, see column 11, lines 9-12) to convert a received signal to a stream of digital (baseband) symbols;

- a channel equalizer (Fig. 2, block 240) to compensate for channel distortions in the demodulated received signal (see Abstract);

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a phase tracking (recovery) unit (Fig. 2, block 240) to track (recover) the phase of the channel equalized signal (see column 7, lines 47-50); and

a decoder (Fig. 2, block 270) to decode the phase recovered (tracked) signal (see column 7, lines 52-54).

Allowable Subject Matter

6. Claims 19-22, 24-27, 38, 39, 41, and 42 are allowable (if above objections are overcome) over prior art references because related references do not disclose controlling a Trellis decoder by providing an estimation signal from the Trellis decoder to the feedback filter of the equalizer when an equalization error is less than or equal to a threshold value.

7. Claims 5-8, 14-17, and 32-35 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ushirokawa (U. S. Patent No. 5, 644, 603) discloses controlling Trellis states in response to a channel estimation.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

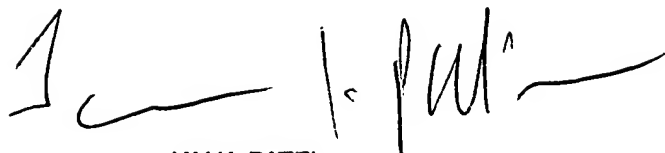
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A handwritten signature in black ink, appearing to read 'Curtis Odom', with a large, stylized loop at the end.

Curtis Odom
December 21, 2006

A handwritten signature in black ink, appearing to read 'Jay K. Patel', with a long horizontal stroke at the end.

JAY K. PATEL
SUPERVISORY PATENT EXAMINER